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ABSTRACT

Golf experts suggest that a performer should attempt to swing the same way during each shot, changing clubs to alter the flight trajectory and distance of the ball. This study sought to determine if there was a difference in the development of golf skill and swing consistency between a control group and an experimental group using an ergogenic aid. Subjects were 32 undergraduate students enrolled in one of two golf classes. Results revealed that: (1) the control group hit significantly more balls than the experimental group during the treatment phase; (2) the experimental group hit significantly fewer balls during the treatment phase than during the post-treatment phase; and (3) there were no other between or within group differences, although the control group scored significantly better than the experimental group on the skill test. It is concluded that ergogenic aid did not produce any group differences in movement consistency and it detracted from the amount of practice of golfers at the beginning/intermediate skill levels, which accounts for the better golf skill demonstrated by the control group at the end of the study. (JD)

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THE EFFECTS OF AN ERGOGENIC AID ON GOLF SWING CONSISTENCY AND SKILL

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ABSTRACT

INCREASED MOVEMENT CONSISTENCY IS THE OBJECTIVE DURING PRACTICE OF CLOSED SKILLS. GOLF EXPERTS SUGGEST THAT A PERFORMER SHOULD ATTEMPT TO SWING THE SAME WAY DURING EACH SHOT, CHANGING CLUBS TO ALTER THE FLIGHT TRAJECTORY AND DISTANCE OF THE BALL. MANY PRACTICE CONDITIONS HAVE BEEN SUGGESTED TO ENHANCE CONSISTENT GOLF SWINGS AND THE RESULTANT GOAL ATTAINMENT, SUCH AS THE STRAIGHT STRIKER, ADVERTISED AS HELPING GOLFERS REDUCE THE VARIABILITY IN THEIR SWING BY: (A) FORCING THEM TO HIT THROUGH THE BALL, AND (B) PROVIDING ERGOGENIC FEEDBACK WHEN MOVEMENT VARIATION OCURRED. THE PURPOSE OF THIS STUDY WAS TO DETERMINE IF THERE WAS A DIFFERENCE IN THE DEVELOPMENT OF GOLF SKILL AND SWING CONSISTENCY BETWEEN A CONTROL GROUP AND AN EXPERIMENTAL GROUP USING THE ERGOGENIC AID. SUBJECTS FOR THE STUDY WERE 32 UNDERGRADUATE STUDENTS ENROLLED IN ONE OF TWO GOLF CLASSES (SAME TEACHER) WHO WERE RANDOMLY ASSIGNED TO ONE OF TWO TREATMENT GROUPS WITH CONTROL FOR CLASS, SEX, AND AMOUNT OF PREVIOUS GOLF EXPERIENCE. ALL SUBJECTS WERE RATED ON THEIR GOLF SKILL AND SWING PRIOR TO THE STUDY, AND THERE WERE NO SIGNIFICANT (p = .05) DIFFERENCES BETWEEN GROUPS. ALL SUBJECTS PARTICIPATED IN TWO GOLF CLASS MEETINGS PER WEEK FOR 17 PRACTICE SESSIONS. THE STUDY WAS DIVIDED INTO 5 SEQUENTIAL PHASES: (A) PRETREATMENT, 4 CLASSES; (B) 1ST VCR TAPING SESSION; (C) TREATMENT, 7 CLASSES; (D) 2ND VCR TAPING SESSION; (E) POSTTREATMENT, 6 CLASSES; AND (F) 3RD VCR TAPING. THE TREATMENT PHASES INVOLVED: (A) INITIAL INSTRUCTION ON THE FULL SWING; (B) RANGE PRACTICE WITH ERGOGENIC AID FOR THE EXPERIMENTAL GROUP, AND RANGE PRACTICE WITHOUT THE ERGOGENIC AID FOR THE CONTROL GROUP; AND (C) RANGE/COURSE PRACTICE WITH NO ERGOGENIC AID USE BY EITHER GROUP. ALL STUDENTS RECEIVED THE SAME INSTRUCTION, PRACTICE CONDITIONS, AND

FEEDBACK EXCEPT FOR THE USE OF THE ERGOGENIC AID BY THE EXPERIMENTAL GROUP DURING THE TREATMENT PHASE. THE VIDEO TAPING SESSIONS WERE HELD SEPARATELY WITH EACH STUDENT IN A CONTROLLED LABORATORY SETTING WITH ONLY THE RESEARCHER PRESENT. EACH SUBJECT WAS VIDEO TAPED USING A FULL SWING TO HIT 10 SELF-PACED SHOTS FROM A PLASTIC MAT USING PRACTICE BALLS AND A 9 IRON. DEPENDENT MEASURES INCLUDED 3 BLOCK SCORES (1/TAPING SESSION) FOR THE FOLLOWING: (A) SKILL/SWING RATING (VANDERHOOF'S SCALE); (B) MEAN SWING TIME (RELIABILITY OF VCR ANALYSIS, $\underline{R}$ = .98); (C) CONSISTENCY (S.D.) OF SWING TIME; AND (D) RANGE OF SWING TIME. IN ADDITION, THE MEAN AND VARIATION OF THE NUMBER OF BALLS HIT/DAY WERE CALCULATED FOR BOTH THE TREATMENT AND POSTTREATMENT PHASES; AND THE ROWLANDS SHORT PITCH TEST WAS ADMINISTERED TO ALL STUDENTS AT THE END OF THE POSTTREATMENT PHASE. THE RESULTS OF THE GROUP*BLOCKS (2 X 3) MANOVA AND RESULTANT ANOVAS ON THE SKILL/SWING RATING, MEAN SWING TIME, CONSISTENCY, AND RANGE OF SWING TIME PRODUCED NO SIGNIFICANT ($\underline{P}$ > .05) MAIN OR INTERACTION EFFECTS. THE GROUP*BLOCKS (2 X 2) ANALYSES ON MEAN AND VARIATION OF BALLS HIT PRODUCED A SIGNIFICANT ($\underline{P}$ < .05) INTERACTION FOR MEAN BALLS HIT WITH: (A) THE CONTROL GROUP HITTING SIGNIFICANTLY MORE BALLS THAN THE EXPERIMENTAL GROUP DURING THE TREATMENT PHASE; (B) THE EXPERIMENTAL GROUP HITTING SIGNIFICANTLY FEWER BALLS DURING THE TREATMENT PHASE THAN DURING THE POST TREATMENT PHASE; AND (C) NO OTHER BETWEEN OR WITHIN GROUP DIFFERENCES. IN ADDITION, THE CONTROL GROUP SCORED SIGNIFICANTLY ($\underline{P}$ < .05) BETTER THAN THE EXPERIMENTAL GROUP ON THE SKILL TEST. THE PRIMARY CONTRIBUTIONS OF THE STUDY SUGGEST THAT THE ERGOGENIC AID: (A) DID NOT PRODUCE ANY GROUP DIFFERENCES IN MOVEMENT CONSISTENCY, AND (B) DETRACTED FROM THE AMOUNT OF PRACTICE OF GOLFERS AT BEGINNING/INTERMEDIATE SKILL LEVELS WHICH LIKELY ACCOUNTS FOR THE BETTER GOLF SKILL BY THE CONTROL GROUP AT THE END OF THE STUDY.

INTRODUCTION

IT HAS BEEN WELL DOCUMENTED THAT GOAL-DIRECTED MOVEMENTS ARE STRONGLY INFLUENCED BY THE ENVIRONMENT IN WHICH THEY ARE PERFORMED (GENTILE, 1972; HIGGINS & SPAETH, 1972; HIGGINS, 1977). WHEN THE CONDITIONS OF A TASK ARE CONSIDERED "CLOSED", AS DEFINED BY POULTON (1957), THE ENVIRONMENT IS STABLE AND PREDICTABLE ALLOWING THE PERFORMER TO CONCENTRATE ON REPEATING THE SPECIFIC MOVEMENT WHICH LEADS TO GOAL-ATTAINMENT. INCREASED MOVEMENT CONSISTENCY IS THE OBJECTIVE DURING PRACTICE OF CLOSED SKILLS (GENTILE, 1972; HIGGINS & SPAETH, 1972; DEL REY, 1971; HOFFMAN, 1974; VORRO, 1973). HITTING A GOLF BALL IS A PRIME EXAMPLE OF A TASK REQUIRING CONSISTENCY FOR ENHANCED PERFORMANCE. A PLAYER SHOULD ATTEMPT TO SWING THE SAME WAY DURING EACH SHOT, CHANGING CLUBS TO ALTER THE FLIGHT TRAJECTORY AND DISTANCE OF THE BALL.

THERE HAVE BEEN MANY TEACHING DEVICES USED TO FACILITATE THE LEARNING AND PERFORMANCE OF A CONSISTENT GOLF SWING (CHUI, 1965). ONE RECENTLY DEVELOPED TRAINING AID DESIGNED TO HELP GOLFERS REDUCE THE VARIABILITY IN THEIR SWING IS THE STRAIGHT STRIKER. IT CONSISTED OF A STAKED WOODEN BASE WITH A 12" PIECE OF PLASTIC TUBING EXTENDING VERTICALLY. THIS TUBE WAS ATTACHED TO A 14" TUBE AT A 90 DEGREE ANGLE. THE 14" TUBE CONNECTED AND BISECTED 24" OF TUBING WHICH SERVED AS A CROSSBAR. THE BALL WAS PLACED IN FRONT OF THE BASE UNDER THE CROSSBAR WITH THE PLAYER ADDRESSING THE BALL AND SWINGING NORMALLY. THE DESIGN OF THE STRAIGHT STRIKER PREVENTED PERFORMERS FROM BRINGING THE CLUB UP TOO QUICKLY DURING THE BACKSWING AND FOLLOW-THROUGH, TWO COMMON MISTAKES MADE BY BEGINNING GOLFERS. IT ALSO FORCED THEM TO "HIT THROUGH THE BALL". IF ERRORS WERE MADE DURING THE SWING, FEEDBACK WAS

GIVEN WHEN THE CLUB CONTACTED THE DEVICE. NO SYSTEMATIC RESEARCH CONCERNING THE EFFECTIVENESS OF THE STRAIGHT STRIKER HAD PREVIOUSLY BEEN CONDUCTED, ALTHOUGH THE MANUFACTURER CLAIMED THAT IT DEVELOPED OR "GROOVED IN" A CONSISTENT SWING WHEN USED.

PURPOSE

THE PURPOSE OF THE PRESENT STUDY WAS TO DETERMINE IF THERE WAS A DIFFERENCE IN THE DEVELOPMENT OF A CONSISTENT GOLF SWING BETWEEN A GROUP OF COLLEGE AGE MALE AND FEMALE BEGINNING-LEVEL GOLFERS USING THE STRAIGHT STRIKER DURING PRACTICE AND A GROUP NOT USING THE STRAIGHT STRIKER WHEN PRACTICING.

SCHEDULE

ALL SUBJECTS PARTICIPATED IN GOLF CLASSES AND TESTING SESSIONS FOR 11 WEEKS WITH TWO CLASS MEETINGS PER WEEK. THERE WERE 17 ACTUAL PRACTICE DAYS FOR ALL SUBJECTS DUE TO A WRITTEN TEST AND INCLEMENT WEATHER. CLASS ORGANIZATION/PROCEDURE WAS CONSISTENT ACROSS DAYS AS CONTENT/SKILL EMPHASIS CHANGED. ALL SUBJECTS RECEIVED THE SAME GROUP INSTRUCTIONS AND DEMONSTRATIONS WITH ATTENTION GIVEN TO INDIVIDUALS AS SPECIFIC ERRORS WERE DETECTED. SUBJECTS PRACTICED HALF OF EACH CLASS ON AND AROUND THE PUTTING GREEN AND THE OTHER HALF ON THE DRIVING RANGE. SUBJECTS RECORDED AN APPROXIMATE NUMBER OF BALLS HIT EACH DAY ON THE DRIVING RANGE. THE STUDY WAS DIVIDED INTO SEVERAL PHASES: (A) PRETREATMENT; (B) FIRST TAPING; (C) TREATMENT; (D) SECOND TAPING; (E) POSTTREATMENT; AND (F) THIRD TAPING.

TREATMENT PHASES

THE PRETREATMENT PHASE COVERED THE FIRST FOUR CLASSES AND FOCUSED ON INTRODUCING PUTTING, CHIPPING, AND THE FULL SWING. IT WAS INTENDED TO EXPOSE NOVICE PLAYERS TO THE MECHANICS OF A CORRECT SWING AND ALLOW THEM A CHANCE TO "GET AN IDEA OF THE MOVEMENT" (GENTILE, 1972). THE MORE EXPERIENCED PLAYERS CONCENTRATED ON IMPROVING THEIR KNOWN WEAKNESSES. UNREALISTIC GAINS WERE NOT EXPECTED IN THIS SHORT TIME, RATHER UNINTERRUPTED PRACTICE TIME WAS THE EMPHASIS. ALL SUBJECTS WERE REQUIRED TO RECORD AN APPROXIMATE NUMBER OF PRACTICE BALLS HIT WHILE ON THE DRIVING RANGE EACH DAY THROUGHOUT THE COURSE OF THE STUDY.

THE TREATMENT PHASE OF THE STUDY LASTED SEVEN SESSIONS WITH A VARIETY OF SHOTS AND CLUBS BEING INTRODUCED. AT THE BEGINNING OF THIS PHASE, SUBJECTS WERE PLACED INTO ONE OF TWO EXPERIMENTAL GROUPS. ALL SUBJECTS IN THE GROUP RECEIVED EQUAL DAILY PRACTICE TIME. STUDENTS IN THE CONTROL GROUP PRACTICED NATURALLY (I.E., WITHOUT THE STRAIGHT STRIKER) AT ALL TIMES. ON THE FIRST DAY OF THIS PHASE, SUBJECTS IN THE EXPERIMENTAL GROUP WERE GIVEN A STRAIGHT STRIKER AND TAUGHT HOW TO ASSEMBLE IT. THE INSTRUCTOR EXPLAINED THE THEORETICAL IDEA BEHIND THE AID WHILE DEMONSTRATING ITS' USE. PROPER BALL PLACEMENT, STANCE ALIGNMENT, AND BALL VIEWING POSITION WERE ALSO DISCUSSED. SUBJECTS WERE TOLD THAT THE STRAIGHT STRIKER MAY BE INITIALLY DISTRACTING, BUT TO DO THE BEST THAT THEY COULD AND THINK ABOUT THE SWING PRINCIPLES COVERED IN CLASS. SUBJECTS WERE ALSO TOLD TO SIMPLY REASSEMBLE THE DEVICE IF THEY STRUCK IT WHILE SWINGING. THE STRAIGHT STRIKER WAS USED BY THE EXPERIMENTAL GROUP DURING ALL PRACTICE WHILE ON THE DRIVING RANGE. TWO SUBJECTS DROPPED OUT OF THE STUDY DURING THIS PHASE: ONE DUE TO AN INJURY; THE OTHER BECAUSE HE FELT THE STRAIGHT STRIKER WAS

SUBJECTS

SUBJECTS PARTICIPATING IN THE STUDY WERE UNDERGRADUATE MALE (N=19) AND FEMALE (N=13) STUDENTS ENROLLED IN ONE OF TWO BEGINNING GOLF CLASSES AT THE UNIVERSITY OF TENNESSEE DURING ONE ACADEMIC QUARTER. PARTICIPATION WAS VOLUNTARY WITH SUBJECTS BEING ALLOWED TO DROP OUT OF THE STUDY AT ANY TIME. NO PORTION OF THE SUBJECT'S FINAL GRADE WAS DEPENDENT UPON PARTICIPATION. PRIOR TO BEGINNING THE STUDY, SUBJECTS WERE INFORMED THAT THERE WOULD BE THREE REQUIRED OUT-OF-CLASS MEETINGS AND THAT THEY WOULD NOT BE ALLOWED TO VIEW THEIR VIDEOTAPES UNTIL ALL TAPING WAS CONCLUDED AT THE END OF THE QUARTER. SUBJECTS ALSO COMPLETED A CONSENT FORM AND A GOLF-EXPERIENCE QUESTIONNAIRE. DEPENDING UPON THEIR RESPONSES, SUBJECTS WERE PLACED INTO EITHER A "MORE EXPERIENCED" OR "LESS EXPERIENCED" CATEGORY. THE "MORE EXPERIENCED" GROUP REPORTED HAVING PREVIOUSLY PLAYED AT LEAST NINE HOLES OF GOLF AND MAY HAVE HAD FORMAL INSTRUCTIONS. THE "LESS EXPERIENCED" GROUP WAS COMPOSED OF TRUE NOVICE PLAYERS WITH LITTLE OR NO PRIOR EXPOSURE TO THE GAME; SEVERAL SUBJECTS HAD NEVER SWUNG A GOLF CLUB PRIOR TO CLASS. SUBJECTS WERE RANDOMLY ASSIGNED TO TREATMENT GROUPS WHILE CONTROLLING FOR: (A) GOLF CLASS; (B) GENDER; (C) GOLF EXPERIENCE; A ONE-WAY ANOVA INDICATED THAT THE TWO TREATMENT GROUPS WERE NOT SIGNIFICANTLY DIFFERENT IN GOLF ABLILITY BEFORE THE TREATMENT GROUPS WERE FORMALIZED (F = .465, P = .992).

ADVERSELY EFFECTING HIS SWING.

THE POSTTREATMENT PHASE CONSISTED OF THE REMAINING SIX CLASSES. DURING THIS PERIOD, THE STRAIGHT STRIKER WAS NO LONGER USED BY THE EXPERIMENTAL GROUP AND ALL CLASS MEMBERS PRACTICED THE SAME WAY EACH DAY. THIS WAS TO DETERMINE IF THE STRAIGHT STRIKER MORE STRONGLY AFFECTED LEARNING OF THE SWING OR SERVED ONLY AS A PERFORMANCE ENHANCER. ON THE LAST DAY OF THE POSTTREATMENT PHASE, SUBJECTS WERE INDIVIDUALLY ADMINISTERED THE ROWLANDS SHORT PITCH TEST (BARROW & MCGEE,1983) BY THE EXPERIMENTER ON THE PRACTICE RANGE. SUBJECTS HIT 14 SHOTS USING A 9-IRON OF THEIR CHOICE TOWARD A TARGET 65 FEET AWAY WHICH CONSISTED OF A PIN/MARKER ENCOMPASSED BY FOUR CONCENTRIC CIRCLES. THE RADII OF THE CIRCLES WERE 3,7,15, AND 22.5 FEET FROM THE CENTER. POINTS WERE AWARDED ON A SCALE FROM 1-5 DEPENDING UPON WHERE THE SHOT INITIALLY HIT THE GROUND. SHOTS LANDING CLOSER TO THE PIN RESULTED IN HIGHER SCORES. A POINT TOTAL WAS CALCULATED FOR EACH INDIVIDUAL FOR ANALYSIS. IN ADDITION, SUBJECTS ALSO FILLED OUT AN EVALUATION CONCERNING THE USE OR NON-USE OF THE STRAIGHT STRIKER. THE CONTROL GROUP WAS ASKED IF THE PRESENCE OF THE STRAIGHT STRIKER AFFECTED HIS/HER PERFORMANCE IN CLASS. THE EXPERIMENTAL GROUP WAS ASKED TO LIST ANY ADVANTAGES AND/OR DISADVANTAGES RESULTING FROM USE OF THE AID.

TAPING SESSIONS

THE VIDEO TAPING SESSIONS WERE CONDUCTED WITHIN TWO DAYS AFTER THE COMPLETION OF EACH TREATMENT PHASE, BUT BEFORE THE START OF THE NEXT PHASE. SUBJECTS SIGNED UP FOR TAPING TIMES DURING THE LAST CLASS PERIOD OF EACH PHASE. STUDENTS WERE REQUIRED TO PARTICIPATE IN ALL THREE TAPING SESSIONS TO BE INCLUDED IN THE STUDY. SUBJECTS WERE VIDEO TAPED INDIVIDUALLY WITH ONLY THE INSTRUCTOR PRESENT TO CONTROL THE CONSISTENCY OF ANY POTENTIAL AUDIENCE EFFECT (CRATTY, 1985). ALL TAPING TOOK PLACE IN THE MOTOR BEHAVIOR LAB AT THE UNIVERSITY OF TENNESSEE USING A PANASONIC OMNIPRO COLOR VIDEO CAMERA PK-802. THE RUNNING TIME OF EACH SUBJECTS' PERFORMANCE WAS RECORDED ON THE TAPE. PILOT TESTING DETERMINED THE MOST EFFECTIVE SETTING FOR RECORDING DATA, WITH SUBJECTS LOCATED 21.58 FEET FROM THE CAMERA. IT WAS SET AT A HEIGHT OF 4.75 FEET WITH A FULLY OPENED LENS.

SUBJECTS STRETCHED AND TOOK SEVERAL PRACTICE SWINGS TO WARM-UP BEFORE RECEIVING PROCEDURAL INSTRUCTIONS. EACH SUBJECT HIT 10 SELF-PACED SHOTS FROM A PLASTIC MAT TAKING A FULL SWING. SUBJECTS USED EITHER A MACGREGOR 9-IRON OR A LEFT-HANDED RAM 9-IRON DURING ALL FILMING. SHORT-FLYTE INDOOR PRACTICE BALLS WERE UTILIZED BECAUSE OF THEIR REALISTIC TRAJECTORY AND LIMITED RICOCHET. AS SUBJECTS PERFORMED, THE INSTRUCTOR SUBJECTIVELY RATED THEIR SWING TECHNIQUE USING VANDERHOOF'S SCALE (AS CITED IN BARROW & MCGEE, 1983) AND A 10-ITEM CHECKLIST WHICH HE DEVELOPED. THE CHECKLIST EMPHASIZED THE EXECUTION OF THE PROPER AMOUNT OF CERTAIN BODY MOVEMENTS (E.G., HIP ROTATION) WHICH WERE CONSIDERED INTEGRAL PARTS OF A GOOD SWING. SUBJECTS WERE GIVEN SEPARATE RATINGS FOR EACH TAPING SESSION. RATINGS RANGED FROM 1 TO 5 WITH SMOOTHER SWINGS TRANSLATING INTO HIGHER SCORES.

SUBJECTS WERE NEVER MADE AWARE OF THEIR RATINGS DURING THE STUDY.

REVIEWING THE TAPES

UPON THE COMPLETION OF ALL FILMING, THE TAPES WERE REVIEWED BY THE INSTRUCTOR IN ORDER TO DETERMINE THE LENGTH OF TIME REQUIRED TO PERFORM EACH SWING. IN THIS PART OF THE STUDY, THE SWING WAS MEASURED FROM INITIAL BACKWARD CLUBHEAD MOVEMENT UNTIL CLUBHEAD CONTACT WITH THE BALL DURING THE FORWARD PHASE OF THE STROKE. A PANASONIC NV-3850 VIDEO CASSETTE RECORDER WITH FRAME-BY-FRAME VIEWING CAPABILITIES ALLOWED ALL SHOTS TO BE TIMED TO THE NEAREST ONE-HUNDREDTH OF A SECOND. EACH COMPLETE TAPING SESSION WAS REVIEWED SEPARATELY. EVERY FIFTH SUBJECTS SCORE WAS RETIMED IN ALL THREE SESSIONS TO CHECK FOR INSTRUCTOR CONSISTENCY IN MEASURING SWING TIME. RATER RELIABILITY WAS CALCULATED FOR EACH SESSION USING THE PEARSON PRODUCT MOMENT CORRELATION ($\underline{R}$ = .97, .99, AND .99).

RESULTS

IN RESPONSE TO THE QUESTIONNAIRE, NO CONTROL SUBJECTS REPORTED FEELING ADVERSELY EFFECTED BY THE PRESENCE OF THE DEVICE, ONLY MILDLY CURIOUS. ANSWERS FROM THE STRAIGHT STRIKER GROUP WERE MIXED, WITH APPROXIMATELY HALF THE STUDENTS INDICATING THE STRAIGHT STRIKER HELPED WITH CONCENTRATION/FOCUS WHILE ALSO MAKING THEM SWING "THROUGH THE BALL." THE OTHER HALF OF THE GROUP RESPONDED THAT THE DEVICE RESTRICTED VISION AND GENERALLY DISTRACTED THEIR SWING.

THE RESULTS OF THE GROUP*BLOCKS (2 X 3) MANOVA AND RESULTANT ANOVAS ON THE MEAN AND CONSISTENCY OF SWING TIME PRODUCED NO SIGNIFICANT ($p > .05$) MAIN OR INTERACTION EFFECTS (FIGURES 1 & 2).

THE GROUP*BLOCKS (2 X 2) MANOVA AND RESULTANT ANOVAS ON MEAN (FIG. 3) AND CONSISTENCY (FIG. 4) OF NUMBER OF BALLS HIT PRODUCED SIGNIFICANT ($p < .05$) INTERACTION EFFECTS. THE PLANNED COMPARISONS FOR MEAN BALLS HIT DETERMINED THAT ALTHOUGH THE PRACTICE TIME WAS EQUAL FOR BOTH THE EXPERIMENTAL AND CONTROL GROUPS: (A) THE CONTROL GROUP HIT SIGNIFICANTLY ($p = .004$) MORE BALLS THAN THE EXPERIMENTAL GROUP DURING THE TREATMENT PHASE; AND (B) THE EXPERIMENTAL GROUP HIT SIGNIFICANTLY ($p = .02$) FEWER BALLS DURING THE TREATMENT PHASE THAN DURING THE POST TREATMENT PHASE. THE PLANNED COMPARISONS FOR THE CONSISTENCY OF NUMBER OF BALLS HIT INDICATED THAT THE CONSISTENCY WAS SIGNIFICANTLY BETTER DURING THE POST TREATMENT PHASE THAN DURING THE TREATMENT PHASES FOR BOTH THE EXPERIMENTAL GROUP ($p = .002$) AND THE CONTROL GROUP ($p = .015$). THERE WERE NO OTHER SIGNIFICANT ($p > .05$) DIFFERENCES FOR EITHER VARIABLE (FIGURES 3 & 4).

IN ADDITION, THE CONTROL GROUP SCORED SIGNIFICANTLY ($\underline{P} < .05$) HIGHER THAN THE EXPERIMENTAL GROUP ON THE SKILL TEST (FIGURE 5).

SUMMARY

THE RESULTS OF THE STUDY SUGGEST THAT THE ERGOGENIC AID:

1. DID NOT PRODUCE ANY GROUP DIFFERENCES IN MOVEMENT CONSISTENCY,
2. DETRACTED FROM THE AMOUNT OF PRACTICE OF GOLFERS AT THE BEGINNING/INTERMEDIATE SKILL LEVELS, WHICH LIKELY ACCOUNTS FOR THE BETTER GOLF SKILL BY THE CONTROL GROUP AT THE END OF THE STUDY.

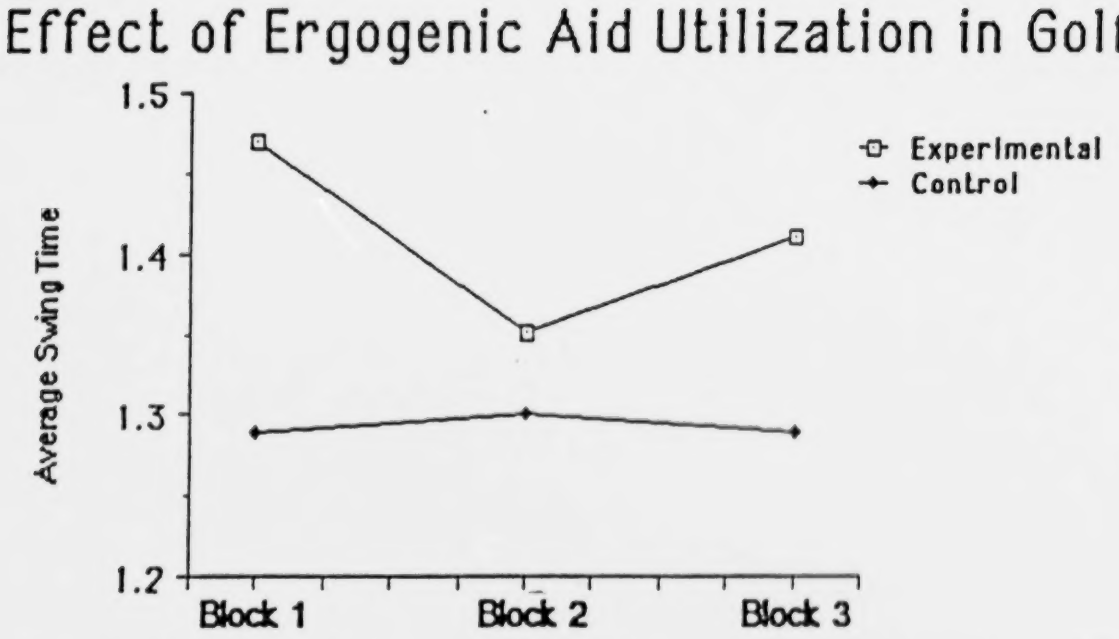

Fig. 1 NonSignificant Group*Blocks Interaction ($p > .05$)

Effect of Ergogenic Aid Utilization in Golf

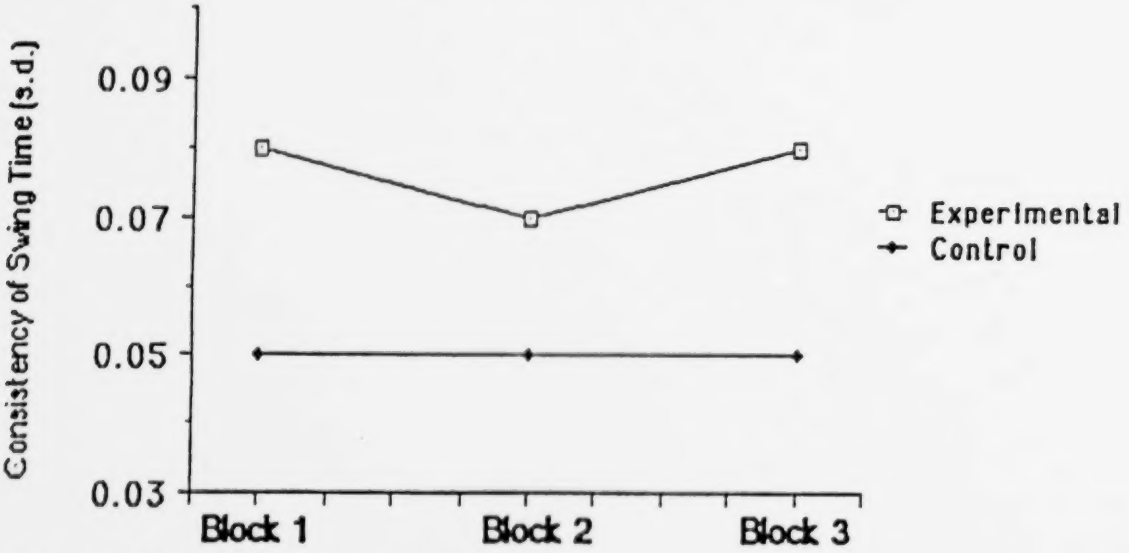

Fig 2 NonSignificant Group*Blocks Interaction ($p > .05$)

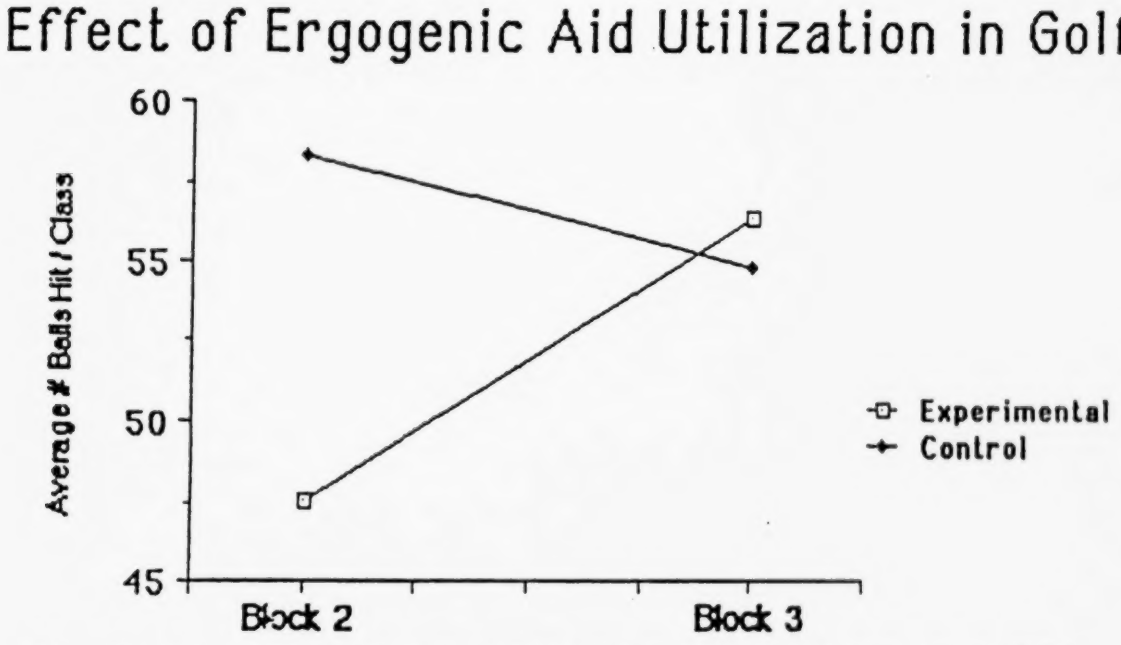

Fig. 3 Significant Group*Blocks Interaction ($p < .05$)

Effect of Ergogenic Aid Utilization in Golf

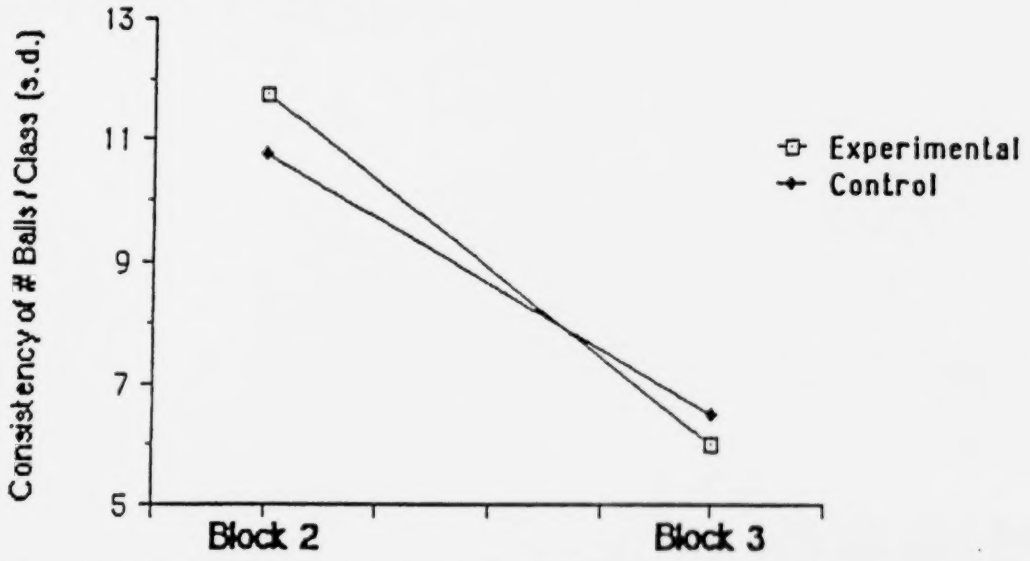

Fig. 4 Significant Group*Blocks Interaction ($p < .05$)

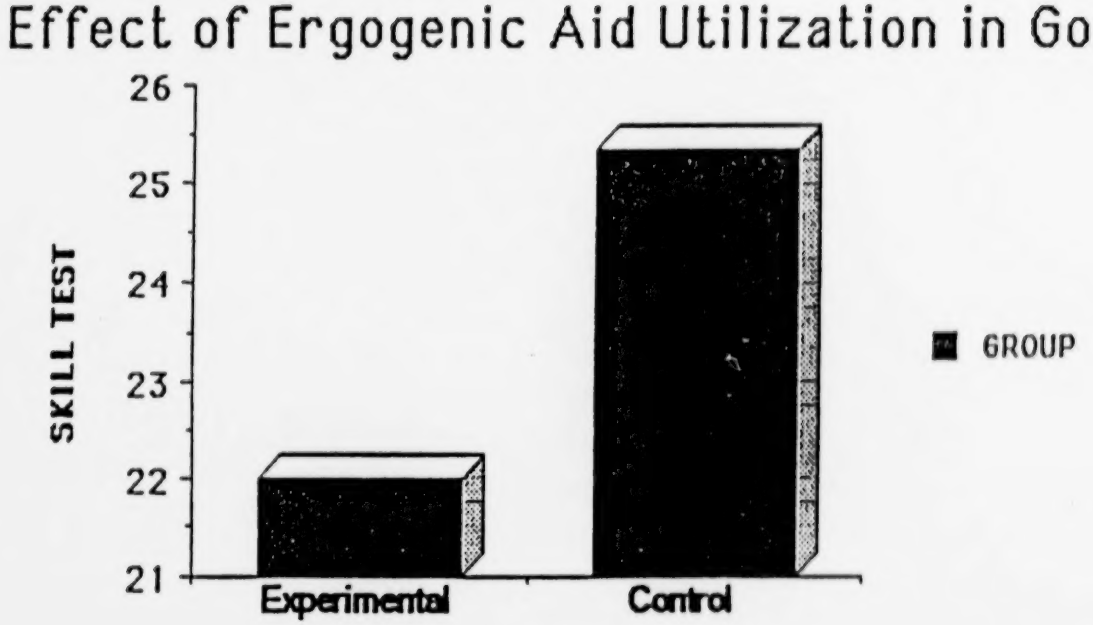

Fig. 5 Significant Group Effect ($p < .05$)

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